lent of the Oneida, the horizon to which Mather referred it forty years ago, the limestone being clearly of lower Helderberg age, while the slates are shown to belong to the Hamilton group. The Medina, Oriskany, and corniferous groups are also recognized here, and the entire thickness of this great outlier is estimated at 2,750 feet.

Perhaps no formation in this country, equally simple in origin and structure, has provoked so much discussion as the triassic of the Atlantic seaboard. The principal problems which it presents, it is well known, are the monoclinal dips of the strata, and their exact relations to the associated masses of trap. As regards the first, geologists are now pretty generally satisfied that the uniform inclination of the beds is not due to their original deposition on a sloping surface, but to faulting or some similar subsequent disturbance. But, while the studies of Prof. W. M. Davis on the triassic of the Connecticut valley have greatly strengthened the view that the trap sheets of that region are mainly contemporaneous lava-flows, regularly interstratified with the sandstones, Professor Cook is unable to accept this explanation for the trap ranges of New Jersey, holding that they are mainly intrusive and subsequent to both the deposition and disturbance of the sandstone. It is satisfactory, however, to observe that both observers are obliged to qualify the expressions of their views by using the word 'mainly,' which really makes the difference one of degree only; and it may very well be that the trap is more generally intrusive in the one field than in the other, or the exposures of the trap may be more favorable for showing its intrusive aspect in New Jersey and its contemporaneous aspect in New England.

The surface geology is described under the heads of 'glacial drift' and 'yellow gravel.' The former characterizes the surface of the northern quarter of the state, and the latter of the southern three-quarters. The problems of the age and origin of the yellow gravel are discussed at some length, but not satisfactorily solved.

The concluding chapters on economic geology treat of the iron and zinc mines, the cretaceous and tertiary marl-beds, water-supply, and drainage.

CHALLENGER REPORT.

Three enormous volumes, aggregating over eighteen hundred pages and one hundred and forty plates, represent the contribution of the Challenger expedition to the scientific knowledge of this attractive group. The reporter, Prof. E. Haeckel of Jena, has devoted some ten years to the study of the collection, and his work forms the largest single report of the whole series.

Report of the scientific results of the exploring voyage of the Challenger. Vol. xviii.: Radiolaria. London, Government. 4°.

The Challenger expedition found Radiolaria universally distributed throughout the ocean, and their skeletons nearly equally wide-spread over its bottom; their relative abundance and species differing in different localities, and these differences being correlated with some of the most interesting and intricate problems of general oceanography. It was fortunate, as observed by Dr. Murray, that so distinguished a naturalist should have been willing to undertake a task so laborious and lengthy as the examination of the thousands of minute forms obtained by the Challenger. Professor Haeckel, as will be seen by the most cursory examination of the plates, was extremely fortunate in having the co-operation of Mr. Adolf Giltsch, who made all the drawings of the sixteen hundred new 'species' figured for the report.

The Radiolaria are marine rhizopods, whose unicellular body always consists of two parts, — an outer calymma, which has no nucleus and from which the pseudopodia extend; and, separated from this by a membrane, an inner capsule with one or more nuclei, serving as the special organ of reproduction and general organic centre. Digestion and relations with the outer world in general are attended to by the calymma, and the distinguishing feature of the class is furnished by the constant capsule-membrane separating the two layers. The radiolarians are usually furnished with a skeleton which presents the greatest beauty and utmost variety of form, and is generally composed of silica, or, in certain cases (Acantharia), of an organic substance called 'acanthin.' The individuals are usually single: in only a small minority are the unicellular organisms united in colonies or caenobia.

A systematic catalogue, which forms the termination of the work, and includes all the Radiolaria known up to 1884, contains twenty 'orders,' eighty-five 'families,' seven hundred and thirty-nine 'genera,' and four thousand three hundred and eighteen 'species.' It is hardly necessary to say that these groups have no such value in terms of organization as those in common use by systematists for higher groups of animals. Professor Haeckel's attitude toward systematic biology is analogous to that of an anarchist toward the civil law, and, like that, if adopted by all naturalists, would be likely to result in an indefinite number of individual despotisms. The multiplication of names and groups, apart from their value in relation to other organisms, is pretty well justified by the enormous number of differentiable forms described. It is more than probable, also, in the absence of discriminative natural selection operat-

ing among these multitudinous lowly organisms, that what is recognized among higher animals as specific differentiation, cannot exist, any more than among the foraminifera. So, for the purpose of marshalling, in some sort of order, the chaos of individuals, perhaps nothing better could have been chosen than the arrangement adopted.

The richest source of the material described is the radiolarian ooze of the Pacific Ocean, the remarkable deep-sea mud consisting chiefly of the skeletons of these animals. The tow-net also yielded rich treasures. Professor Haeckel has also included the fruit of his own numerous journeys to the Mediterranean and the eastern Atlantic as well as to the Indian Ocean. Capt. Heinrich Rabbe of Bremen also contributed most important material from the Indian seas; and the collections of Murray and others on various expeditions, such as the Knight-errant and Triton voyages, added to the total. The alimentary canal of various pelagic organisms and even Jurassic coprolites have been laid under contribution. Dr. R. Teuscher of Jena has co-operated with the author in his work: among other things he undertook the tedious micrometric measurements, some eight thousand in number, by which the constancy of the so-called specific forms was endeavored to be tested. The result showed their inconstancy, as might be expected. The conclusion of Professor Haeckel that all other organisms exhibit a similar inconstancy, is, we believe, not in accordance with the general experience of naturalists.

No description can do justice to the wonderful variety and beauty of these minute creatures, and for fuller realization the reader must turn to the plates of what we may properly call this stupendous undertaking.

FOURTH ANNUAL REPORT OF THE BUREAU OF ETHNOLOGY.

THE present volume, which has just been issued, contains the report of the director for 1882–83, and some papers of eminent value. The latter must be reviewed separately, and we shall confine ourselves to some remarks on Major Powell's report. The broad basis on which the researches of the bureau are carried on is due to him, and ethnologists must be thankful for his encouragement of special lines of study — for instance, Mallery's researches on sign-language and pictography — and of special researches on certain groups of tribes, which cannot be made without the assistance and support of a powerful institution. In this respect the work of the bureau is of the greatest value, as it puts an end to the dilettanteism which formerly obtained in American ethnology. Major Powell's attempts to gain the co-operation of scientists not officially connected with the bureau cannot but exert a wholesome and encouraging influence on American ethnology. Numerous valuable researches which are included in the reports of the bureau and in the contributions to North American ethnology are proof of this.

Another important feature of the work of the bureau is the broad and systematic plan by which Major Powell carries on the researches of the bureau. He keeps three publications particularly in view. His remarks on this subject are of great interest. He contemplates the publication of, "1°, a series of charts showing the habitat of all tribes when first met by Europeans, and at subsequent eras; 2°, a dictionary of tribal synonymy, which should refer the multiplied and confusing titles, as given in literature and in varying usage, to a correct and systematic standard of nomenclature; 3°, a classification, on a linguistic basis, of all the known Indians of North America, remaining and extinct, into families or stocks.

"The order of possible preparation of these publications is the reverse of the above. The charts cannot be drawn until the tribes, as villages, confederacies, and leagues, shall have been resolved from multiplicity and confusion into identification and simplicity. The linguistic classification precedes the whole of the work, and the difficulties attending it have at times suspended its satisfactory progress until expeditions of research had been sent forth to clear up the obstacles of uncertainty and ignorance. Numerous publications of ethnologic charts of partial synonymes and of tentative classifications have appeared from various sources, but all have been imperfect and more or less erroneous. The personal attention of the director and of all the officers and employees of the bureau has been steadily directed, in addition to the several branches of work from time to time undertaken, to presenting them in a proper form. The labor and study required have been beyond expression, but may be partially indicated by the fact that, apart from the linguistic and sociologic problems involved, the mere mechanical compilation has produced over twenty thousand cards of synonymy. The present condition of this interconnected work is encouraging." The publication of this material will be the first sound basis of continued researches on American ethnology. We do not enter into the details of the field-work done by the bureau, as during the subsequent years much additional work has been done, and has become known in its outlines. In this respect it must particularly be regretted that these reports, like most other government publications, are not sooner issued.